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(54) Bicycle brake assembly

(57) A bicycle brake assembly is disclosed for coupling a bicycle brake device (32) onto either front (16) or rear forks of a bicycle (10) by a brake fixing mechanism. The brake fixing mechanism has a fixing member (130) or plate fixedly coupled to either the front (16) or rear forks and a bracing member (132) or plate coupled to the fixing member (130) such that the bicycle brake device (32) is pivotally coupled between the fixing member (130) and the bracing member (132). The fixing member (130) and the bracing member (132) are rigidly coupled together at their upper ends by a connecting member (133). In the most preferred embodiment, the fixing member (130) and the bracing member (132) are integrally formed as a one-piece, unitary member from a sheet material. Preferably, the brake device (30) is a cantilever brake with its pivot pins (35a, 35b) interconnecting the lower ends of the fixing member (130) and the bracing member (132).

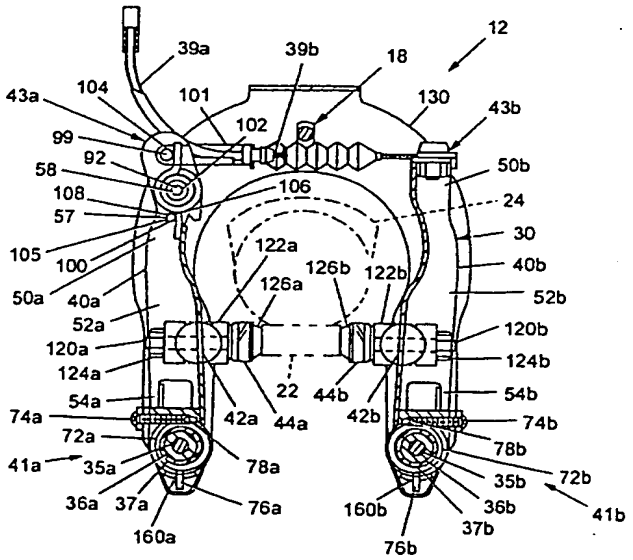

Fig. 6

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invention, there is provided a bicycle brake assembly according to claim 23.

It will be apparent to those skilled in the art that the bicycle brake assembly in accordance with the present invention should not be limited to cantilever type brake devices. Rather, the bicycle brake assembly in accordance with the present invention can be utilized with other types of brake devices such as center pull type caliper brakes and the like. Moreover, the bicycle brake assembly can be coupled to either the front or rear forks of the bicycle as needed and/or desired. In addition, the present invention can be adapted for use with other types of brake arms than the ones illustrated herein.

Other objects, advantages and salient features of the present invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

Referring now to the attached drawings which form part of this original disclosure:

Fig. 1 is a partial, side elevational view of a conventional bicycle using a bicycle brake assembly in accordance with the present invention;
Fig. 2 is a front elevational view of the bicycle brake assembly in accordance with the present invention;
Fig. 3 is a left side elevational view of the bicycle brake assembly illustrated in Fig. 2;
Fig. 4 is a right side elevational view of the bicycle brake assembly illustrated in Figs. 2 and 3;
Fig. 5 is a front elevational view of the bicycle brake assembly illustrated in Figs. 2-4, with the bracing member of the brake fixing mechanism removed to illustrate the brake arms;
Fig. 6 is a front elevational view of the bicycle brake assembly illustrated in Figs. 2-5, with the bracing member of the brake fixing mechanism removed and certain portions of the brake arms broken away for purposes of illustration;
Fig. 7 is a left side elevational view of the bicycle brake assembly illustrated in Figs. 2-6, with certain portions broken away to illustrate certain aspects of the present invention;
Fig. 8 is a right side elevational view of the bicycle brake assembly illustrated in Figs. 2-7, with certain portions broken away for illustrating certain aspects of the present invention;
Fig. 9 is an exploded left side elevational view of the bicycle braking assembly illustrated in Figs. 2-8;
Fig. 10 is an exploded right end elevational view of the bicycle brake assembly illustrated in Figs. 2-9;
Fig. 11 is an enlarged front end elevational view of one of the casings for the axle assembly of the bicycle brake assembly;
Fig. 12 is an enlarged side elevational view of the casing illustrated in Fig. 11 for the axle assembly of the bicycle brake assembly in accordance with the present invention;
Fig. 13 is an enlarged rear end elevational view of the casing illustrated in Figs. 11 and 12 for the axle assembly of the bicycle brake assembly in accordance with the present invention;
Fig. 14 is a front elevational view of the support or fixing mechanism for the bicycle brake assembly in accordance with the present invention;
Fig. 15 is a bottom plan view of the support or fixing mechanism illustrated in Fig. 14 for the bicycle brake assembly in accordance with the present invention;
Fig. 16 is a cross-sectional view of the support or fixing mechanism illustrated in Figs. 14 and 15 for the bicycle brake assembly in accordance with the present invention as viewed along section line 16-16 of Fig. 15; and
Fig. 17 is an elevational view of the support or fixing mechanism illustrated in Figs. 14-16 for the bicycle brake assembly prior to being bent.

Referring initially to Fig. 1, a conventional bicycle 10 is illustrated having a bicycle brake assembly 12 fixedly coupled to the frame 14 of the bicycle 10. More specifically, bicycle brake assembly 12 is fixedly coupled to front fork 16 of frame 14 via three coupling members 18, 20a and 20b. Coupling members 18, 20a and 20b are designed to allow for adjustment of coupling bicycle brake assembly 12 in relationship to the rim 22 of the bicycle wheel 24 as explained below in more detail.

Bicycle brake assembly 12 is operated in a substantially conventional manner by the rider via a conventional brake operating device or lever 26 which is mounted on the handle bar 28 of bicycle 10 in a conventional manner. Bicycles and their various components are well-known in the prior art, and thus, bicycle 10 and its various components such as brake operating device 26, will not be discussed or illustrated in detail herein.

Bicycle brake assembly 12 basically includes a brake device 30 (Fig. 3) for engaging and applying a braking force against rim 22 of bicycle wheel 24, and a brake support or fixing mechanism 32 for coupling brake device 30 to frame 14 via coupling members 18, 20a and 20b. While bicycle brake assembly 12 is illustrated as being coupled to front fork 16 of bicycle frame 14, it will be apparent to those skilled in the art from this disclosure that bicycle brake assembly 12 can be coupled to the rear fork of bicycle frame 14.

Brake device 30 is pivotally coupled to brake support or fixing mechanism 32 via a pair of axle assemblies. Each of the axle assemblies are substantially identical. As best seen in Figs. 6-8, the left axle assembly includes a pivot pin 35a, a spacing sleeve 36a, a first bushing 37a and a second bushing 38a. Similarly, right axle assemblies has a pivot pin 35b, a spacing sleeve 36b, a first bushing 37b and a second bushing 38b. Preferably, brake device 30 and brake fixing mechanism 32 are coupled together via pivot pins 35a and 35b such

Biasing member 41a is mounted on pivot pin 35a and engages brake arm 40a and brake fixing mechanism 32. Biasing member 41a includes a casing 70a, a torsion or return spring 72a and an adjustment screw 74a. Casing 70a and return spring 72a are both coaxially mounted on pivot pin 35a and spacing sleeve 36a such that they are located between the front plate 46a and rear plate 48a of brake arm 40a. Biasing member 41a is designed to normally bias brake arm 40a in a counter-clockwise direction as seen in Figs. 5 and 6. Accordingly, brake arm 40a is biased by biasing member 41a such that brake shoe 44a normally moves away from rim 22 of bicycle wheel 24. More specifically, return spring 72a is mounted within casing 70a such that a first end 76a of return spring 72a engages a part of brake fixing mechanism 32 and a second end 78a of return spring 72a engages adjustment screw 74a of biasing member 41a as seen in Figs. 6 and 7.

More specifically, casing 70a is provided with a cylindrical recess 80a for receiving the coiled portion of return spring 72a therein, a lower recess 82a for receiving first end 76a of return spring 72a and a portion of brake fixing mechanism 32 therein, and a upper recess 84a for receiving second end 78a of return spring 72a therein. A threaded hole 86a is provided within casing 70a for threadedly receiving adjustment screw 74a therein. Threaded hole 86a is in alignment with the upper recess 84a such that the end of adjustment screw 74a engages the second end 78a of the return spring 72a for adjusting the amount of biasing force applied by return spring 72a between brake arm 40a and brake fixing mechanism 32 for returning brake arm 40a to the disengaged position.

Similar to biasing member 41a, biasing member 41b includes a casing 70b, a torsion or return spring 72b and an adjustment screw 74b. Casing 70b and return spring 72b as seen in Figs. 6 and 8 are both coaxially mounted on pivot pin 35b and spacing sleeve 36b such that they are located between the front plate 46b and rear plate 48b of break arm 40b. Biasing member 41b is designed to normally bias brake arm 40b in a clockwise direction as seen in Figs. 5 and 6. Accordingly, brake arm 40b is biased by biasing member 41b such that brake shoe 44b normally moves away from rim 22 of bicycle wheel 24. More specifically, return spring 72b is mounted within casing 70b such that a first end 76b of return spring 72b engages a part of brake fixing mechanism 32 and a second end 78b of return spring 72b engages adjustment screw 74b of biasing member 41b.

As seen in Figs. 11-13, casing 70b is provided with a cylindrical recess 80b for receiving the coiled portion of return spring 72b therein, a lower recess 82b for receiving first end 76b of return spring 72b and a portion of brake fixing mechanism 32 therein, and a upper recess 84b for receiving second end 78b of return spring 72b therein. A threaded hole 86b is provided within casing 70b for threadedly receiving adjustment screw 74b therein. Threaded hole 86b is in alignment with the upper recess 84b such that the end of adjustment screw 74b engages the second end 78b of the return spring 72b for adjusting the amount of biasing force applied by return spring 72b between brake arm 40a and brake fixing mechanism 32 for returning brake arm 40b to the disengaged position.

As seen in Fig. 9, wire mounting portion 43a, which is coupled to brake arm 40a, includes a pair of attachment members or plates 90, a pivot pin 92, a set of bushings 94-96, a torsion spring 98, a connecting pin 99 and a stop pin 100. Basically, wire mounting portion 43a is pivotally coupled to upper portion 50a of brake arm 40a via pivot pin 92 which is received through the hole 58 in the upper portion 50a of brake arm 40a. More specifically, attachment plates 90 each have a pivot hole 102 formed therein for receiving pivot pin 92 therethrough. One of the attachment plates 90 is positioned adjacent the front plate 46a of brake arm 40a, while the other attachment plate 90 is positioned adjacent the rear plate 48a of brake arm 40a as seen in Figs. 3 and 7.

Also, each of the attachment plates 90 has a connecting hole 104 for receiving connecting pin 99 therethrough for attaching the brake cable thereto via connecting member 101, and a connecting hole 105 for receiving stop pin 100 therein, as seen in Figs. 5 and 6. The lower ends of attachment plates 90 are also provided with a slot 106 which forms a pair of stop surfaces 108 for engaging stop pin 100. Accordingly, stop pin 100 cooperates with stop surfaces 108 of slot 106 to limit the amount of rotational movement of attachment plates 90 relative to brake arm 40a. Stop pin 100 is fixedly received within the hole 57 in the upper portion 50a of brake arm 40a.

Bushings 94 and 95 are coaxially mounted about pivot pin 92 such that torsion spring 98 is also coaxially mounted about pivot pin 92. Bushings 94 and 95 are designed to maintain proper separation between attachment plates 90, as well as to prevent any interference between the rotational movement of attachment plates 90 relative to torsion spring 98 and/or the upper portion 50a of brake arm 40a. Torsion spring 98 has a first end 110 engaging stop pin 100 and a second end 112 for engaging connecting pin 99 such that attachment plates 90 are normally biased in a counter-clockwise direction about pivot pin 92 as seen in Fig. 2. Of course, as mentioned above, the left stop surface 108 engages stop pin 100 to limit the rotational movement of attachment plates 90.

Referring now to Figs. 8 and 10, wire mounting portion 43b has a clamping plate 114, a clamping screw 116 and a clamping nut 118. The wire from the brake cable is received between the upper surface of upper portion 50b of brake arm 40b and the lower surface of clamping plate 114 for securing the brake wire therebetween. More specifically, clamping screw 116 is tightened such that clamping plate 114 secures brake wire to the upper portion 50b of brake arm 40b. Nut 118 is received between the side walls of brake arm 40b such that rotation

30 are securely supported therebetween.

Since coupling members 20a and 20b are not fixed to the fork, fixing plate 130 can be coupled to a wide variety of bicycles. Moreover, the brake arch ratio of the brake arms 40a and 40b can remain constant.

In operation, when the rider operates the brake lever of the brake operating device 26, the inner wire of the brake cable is pulled within the outer casing of the brake cable so that the upper portions 50a and 50b of brake arms 40a and 40b are pulled inwardly. Thereafter, the friction pads 126a and 126b on the brake shoe holders or pad supports 122a or 122b are pressed against the side surfaces of rim 22, thus causing a braking action to be performed. In other words, brake arm 40a rotates in a clockwise direction about pivot pin 35a against the force of return spring 72a and brake arm 40b rotates in a counter clockwise direction about pivot pin 35b against the force of return spring 72a. Once the rider releases the brake lever of the brake operating device 26, the brake wire 39b of the brake cable is relaxed so that the return springs 72a and 72b within the brake arms 40a and 40b cause the brake arms 40a and 40b to pivot in the opening direction. As a result, the tip ends of the friction pads 126a and 126b on the brake shoe holders 122a and 122b are withdrawn from the side surfaces of rim 22 so that the braking action is released.

While only one embodiment of the present invention has been described and illustrated herein, it will be apparent to those skilled in the art once given this disclosure that various modifications, changes, improvements and variations may be made without departing from the spirit or scope of this invention as defined in the following claims.

Claims

1. A bicycle brake assembly for attachment to a portion of a bicycle frame, comprising:

   a substantially U- or C-shaped fixing member (130) adapted to be coupled to the bicycle frame, said fixing member (130) having a center portion (134) and a pair of leg portions (136a, 136b) extending therefrom to form a wheel receiving recess therebetween, said leg portions (136a, 136b) having a pair of first pivot points to pivotally couple a pair of brake arms (40a, 40b) thereto, respectively;

   a substantially U-or C-shaped bracing member (132) having a center portion (161) and a pair of leg portions (162a, 162b) for forming a wheel receiving recess therebetween, said leg portions (162a, 162b) of said bracing member (132) having a pair of second pivot points to pivotally couple brake arms (40a, 40b) thereto, respectively; and

   a connecting member (133) fixedly coupled between said fixing member (130) and said bracing member (132) at a location spaced from said first and second pivot points such that the brake arms (40a, 40b) are pivotally located between said fixing member (130) and said bracing member (132).

2. A bicycle brake assembly according to claim 1, wherein

   said connecting member (133) extends between said center portion (134) of said fixing member (130) and said center portion (161) of said bracing member (132).

3. A bicycle brake assembly according to either preceding claim, wherein

   said first and second pivot points are holes (60a, 60b) for receiving a pair of pivot pins (35a, 35b).

4. A bicycle brake assembly according to any preceding claim, wherein

   said fixing member (130), said bracing member (132) and said connecting member (133) are integrally coupled together as a one-piece, unitary member (32).

5. A bicycle brake assembly according to claim 4, wherein

   said fixing member (130), said bracing member (132) and said connecting member (133) are formed from a sheet material.

6. A bicycle brake assembly according to either claim 4 or claim 5, wherein

   said fixing member (130) is connected to said connecting member (133) at a first fold line (137), and said bracing member (132) is connected to said connecting member (133) at a second fold line (163).

7. A bicycle brake assembly according to any preceding claim, wherein

   said center portion (134) of said fixing member (130) has a coupling element (18) coupled thereto for attaching to the bicycle frame.

8. A bicycle brake assembly according to claim 7, wherein

   said coupling element is a bolt having a threaded end with a nut (146) threadedly coupled thereto.

9. A bicycle brake assembly according to any preceding claim, wherein

   said center portion (134) of said fixing member (130) has a hole (138) for attachment to the bi-

portions being pivotally coupled to said pivot points of said brake arms (40a, 40b), respectively;

a substantially U- or C-shaped bracing member (132) having a center portion (161) and a pair of leg portions (162a, 162b) extending therefrom for forming a wheel receiving recess therebetween, said brake arms (40a, 40b) pivotally coupled to said bracing member (132) at said pivot points of said brake arms (40a, 40b), respectively, such that said brake arms (40a, 40b) are located between said fixing member (130) and said bracing member (132); and

a connecting member (133) fixedly coupled between said fixing member (130) and said bracing member (132) at a location spaced from said pivot points of said brake arms (40a, 40b).

24. A bicycle brake assembly according to any preceding claim, wherein the leg portions (162a, 162b) of the bracing member (132) extend to free ends.

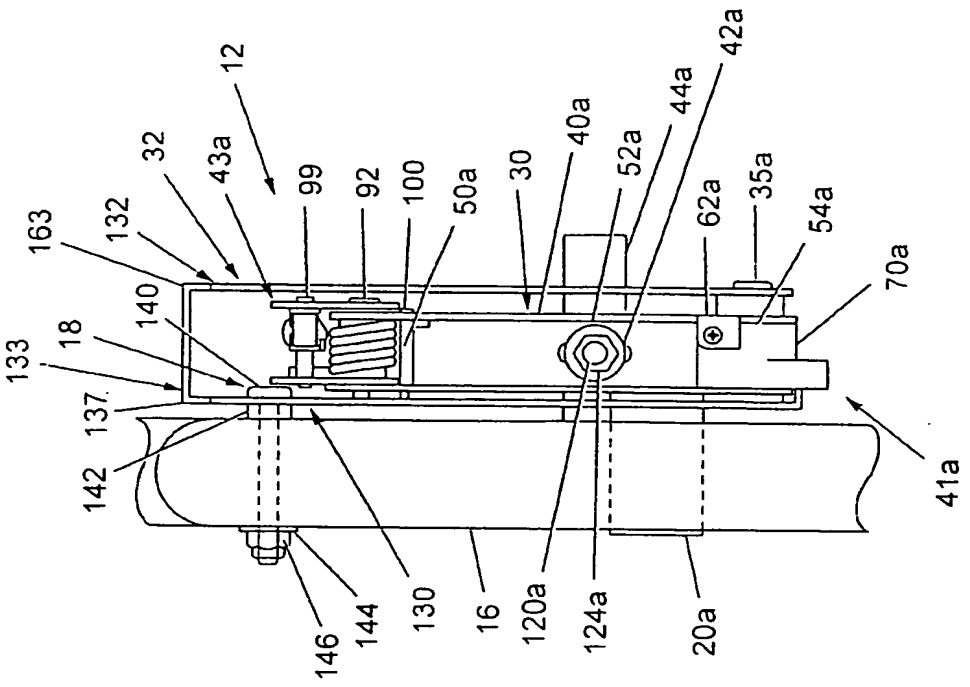

12
32
43a
99
92
100
50a
30
40a
52a
44a
42a
62a
35a
54a
70a
163
132
140
18
133
137
142
146
144
130
16
120a
124a
20a
41a

Fig. 3

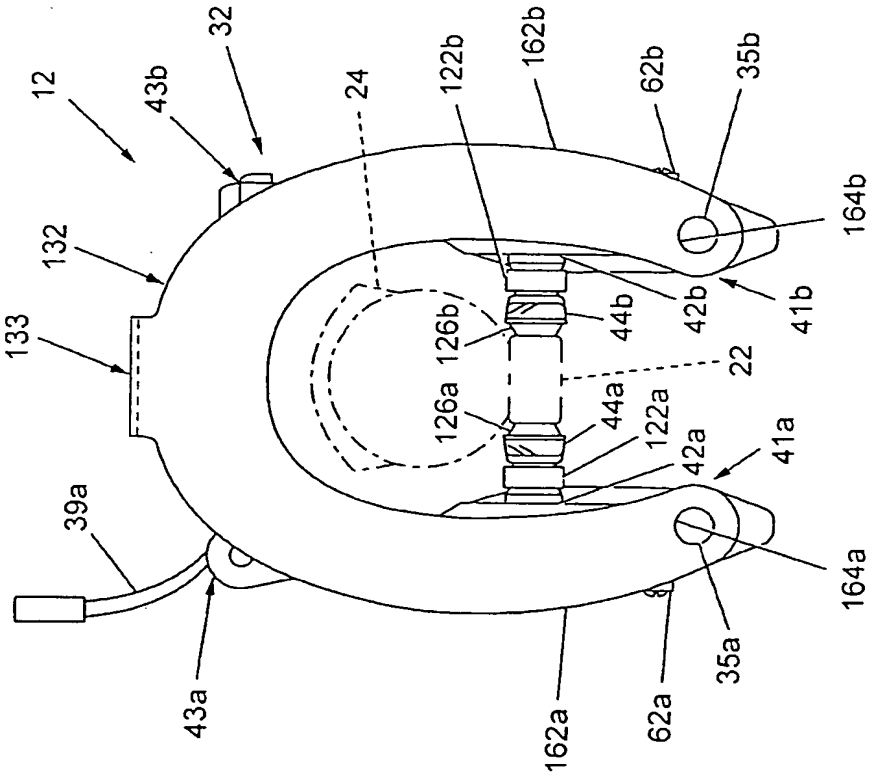

12
43b
32
24
122b
162b
62b
35b
164b
132
133
126b
44b
42b
41b
22
126a
44a
122a
42a
41a
39a
164a
43a
162a
62a
35a

Fig. 2

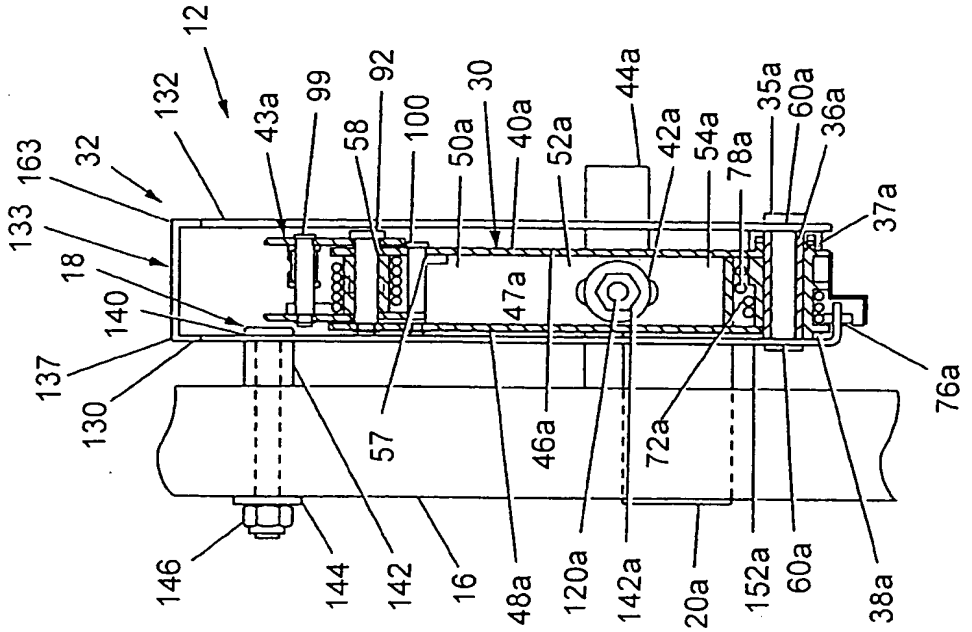
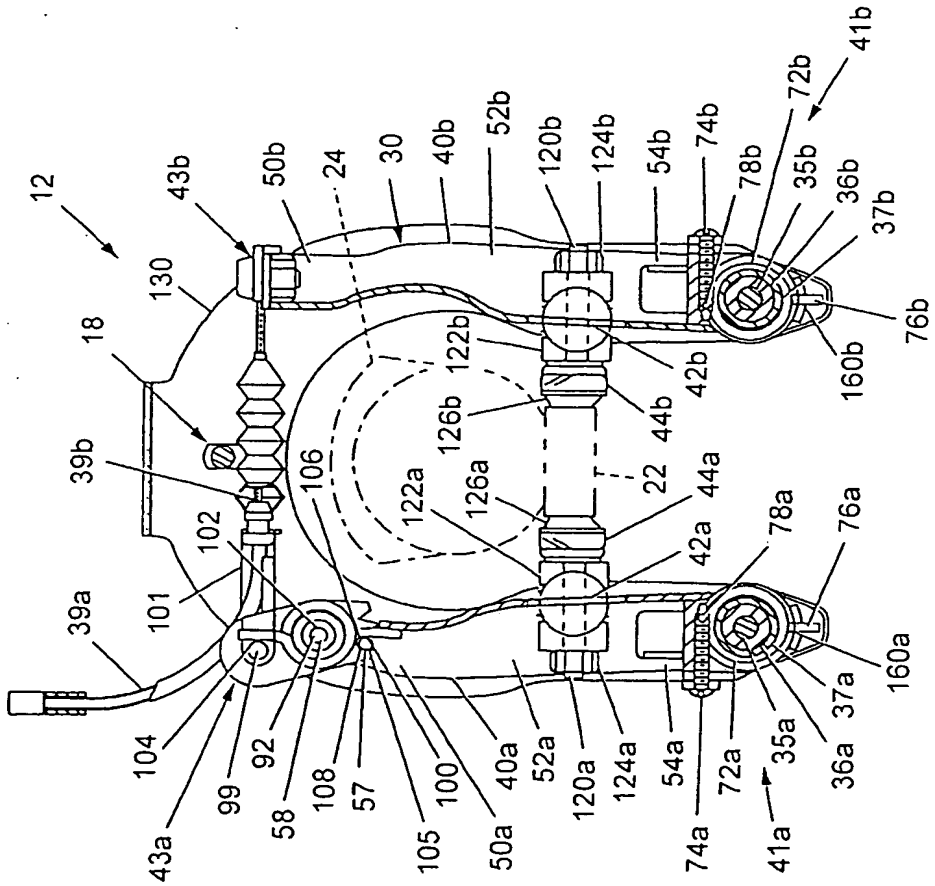

12
132
43a
99
92
58
100
50a
30
40a
52a
44a
42a
54a
78a
35a
60a
36a
37a
163
32
133
18
140
137
130
57
47a
46a
72a
76a
146
144
142
16
48a
120a
142a
20a
152a
60a
38a

Fig. 7


12
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50b
24
30
40b
52b
120b
124b
54b
74b
78b
35b
36b
37b
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130
18
76b
160b
122b
42b
126b
44b
22
39b
106
122a
126a
44a
102
42a
78a
76a
39a
101
160a
104
92
108
57
100
40a
52a
120a
124a
54a
72a
35a
37a
36a
99
58
105
50a
74a
41a
43a

Fig. 6

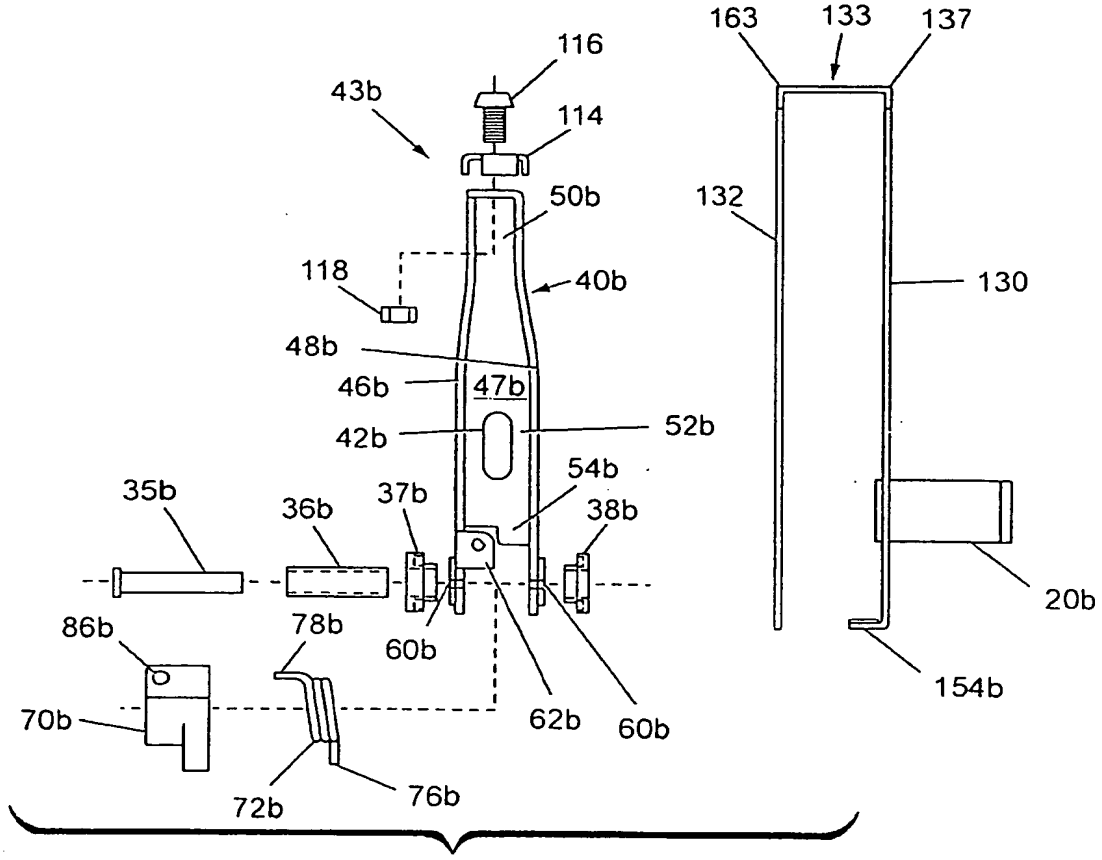

Fig. 10

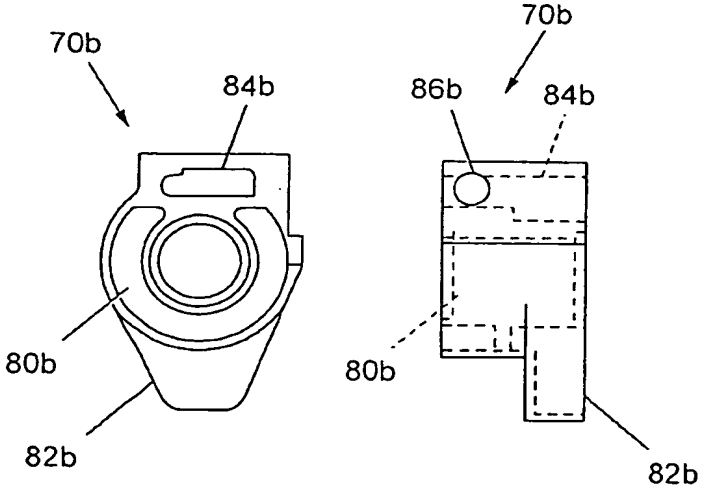

Fig. 11

Fig. 12

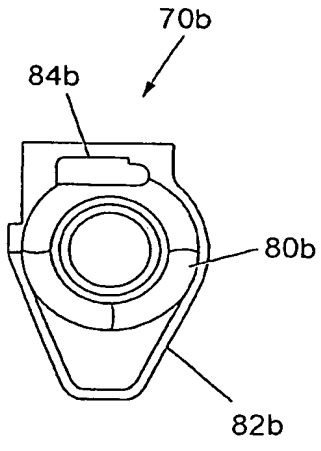

Fig. 13

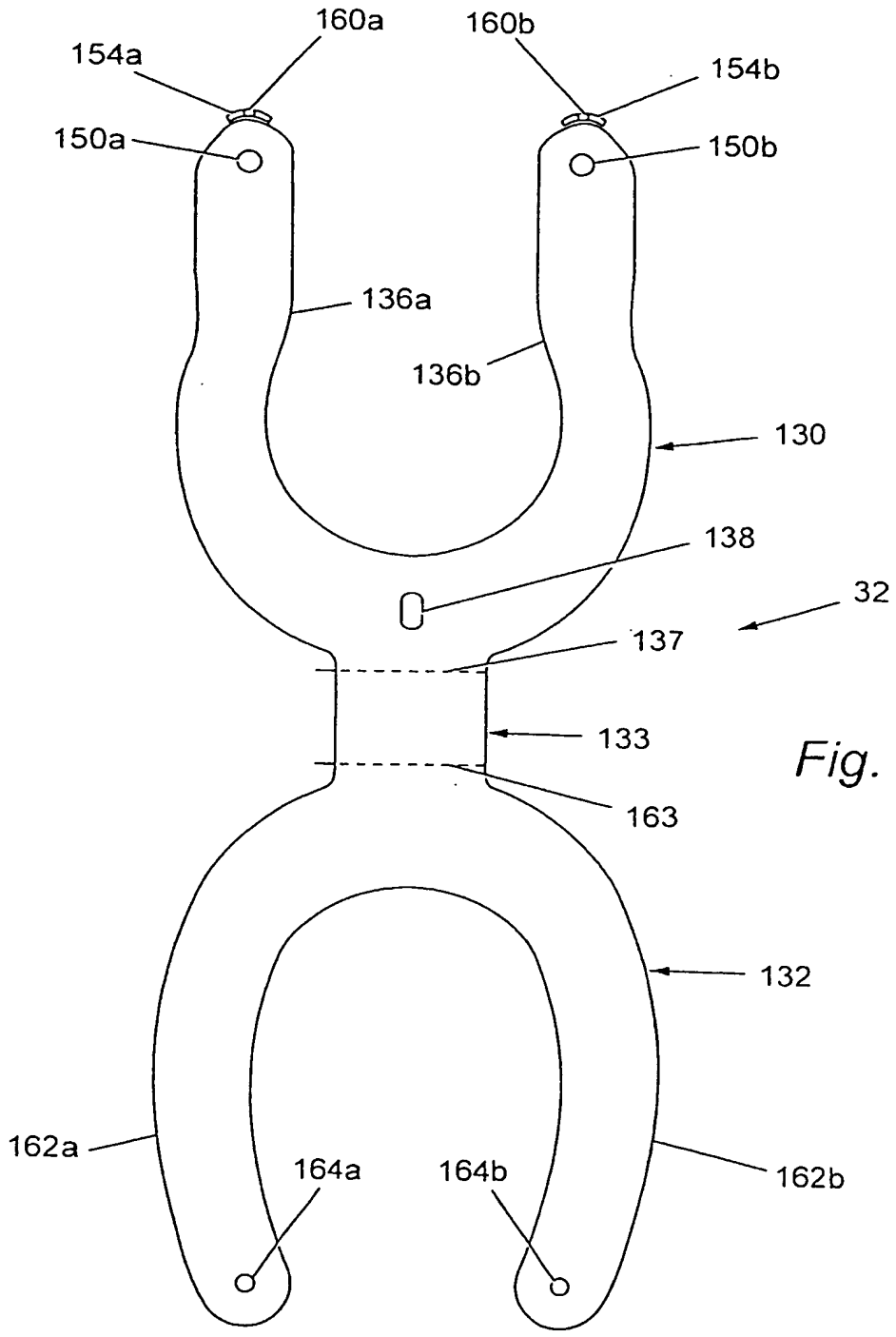
160a
160b
154a
154b
150a
150b
136a
136b
130
138
32
137
133
163
132
162a
164a
164b
162b

Fig. 17